wherein said cooling mechanism maintains said target substrate and the focus ring at substantially the same temperature; and

wherein said clamp comprises an outer cover consisting essentially of a heat-resistant synthetic resin.

REMARKS

Favorable reconsideration of this application is respectfully requested.

Claims 1, 3, 5, 6, 9-12, 14, 17, and 19-21 are pending in this application, claims 2, 7, 15, 16, and 22-24 being canceled by way of the present amendment.

It is noted that the changes made in the previous amendment included an extra word "so" in line 9 of claim 1 and the fourth line of claim 14 was repeated. The language of claims 1 and 14 prior to amendment in this response has been correctly transcribed.

Under 35 U.S.C. §103(a), claims 2, 3 and 15 stand rejected over JP 07310187 (Nozawa) in view of U.S. 4,282,924 (Faretra), claims 7 and 16 stand rejected over Nozawa in view of U.S. 5,904,778 (Lu et al.), and claims 9 and 19 stand rejected over Nozawa in view of U.S. 5,405,491 (Shahvandi et al.). Claims 1, 5, 6, 14, 17, 20 and 22-24 stand rejected under 35 U.S.C. 102(b) as anticipated by Nozawa. Claims 12 and 21 were found to recite patentable subject matter.

The applicants greatly appreciate the finding of claims 12 and 21 to recite patentable subject matter. Claims 12 and 21 have been rewritten into independent form, and are therefore in condition for allowance. Further, claim 5 dependent from claim 21 is also believed to be in condition for allowance.

Each of claims 1 and 14 have been amended to recite a focus ring consisting essentially of a conductive material and a heat transfer medium consisting essentially of a

conductive material. Such a worktable device as recited in each of claims 1 and 14 is not rendered obvious by the cited prior art.

Nozawa discloses, in paragraph [0002], a protection plate made of ceramic or quartz to protect an exposed of the worktable made of metal, such as aluminum or stainless steel. In paragraphs [0004] and [0005], Nozawa states that a conductive film may be formed in the protection plate so that protection plate can be fixed by an electrostatic chuck. According to this description, the conductive film would be formed on the backside of the protection plate. In other words, even if the conductive film is formed in the plate, the protection plate itself on the top surface is an insulating material.

Each of claims 1 and 14 recite a worktable device having a focus ring consisting essentially of a conductive material and a heat transfer medium consisting essentially of a conductive material. With the worktable device according to claims 1 and 14, the target substrate and the focus ring will have substantially the same electric potential. As a consequence, a uniform plasma may be formed over the target substrate and the focus ring. Such devices are not disclosed or suggested by Nozawa and thus claims 1 and 14 are patentably distinguishable over Nozawa.

The Office Action relies upon the Faretra to teach a thermally conductive silicon rubber material as a heat transfer medium. The reference was not relied upon to reject the elements of claims 7 and 16 which have been incorporated into claims 1 and 14, respectively. Accordingly claims 1 and 14 are patentably distinguishable over a combination of Nozawa and Faretra.

Paragraph [0002] of Nozawa describes how a protection plate 33 formed with a ceramic such as quartz is used to protect the insulation base 32 which is formed of a metal material such as aluminum and stainless steel. The temperature of protection plate 33 may rise due to exposure to the plasma and affect the plasma processing characteristics. Nozawa

employs a cooling means to insure the protection plate is maintained at a desirable temperature. Nozawa makes no suggestion that a thermally conductive silicon carbide focus ring would be used in the disclosed system.

The Office Action looks to Lu et al. to provide a suggestion that it would have been obvious to use a thermally conductive silicon carbide for a focus ring for efficient cooling. As mentioned above, Nozawa employs an insulating protective plate. Nozawa particularly employs the insulating plate, and makes no mention of any other suitable plate. Lu et al. describe that focus rings may be made of SiC, but do not suggest using such a ring in a device such as that disclosed in Nozawa having an insulating plate and a cooling mechanism. There is thus no motivation for using a focus ring as taught by Lu et al. in the device of Nozawa. Accordingly, claims 1 and 14 are patentably distinguishable over a combination of Nozawa and Lu et al.

Claims 9 and 19 were rejected based upon a combination of Nozawa and Shahvandi et al. The clamping mechanism of Shahvandi et al. is one used ordinarily for clamping wafers which are frequently exchanged. Clamp 40 includes base 44 and ceramic layer 46. Focus ring 48 overlays layer 46. Clearly, the clamp 40 of Shahvandi et al. has nothing to do with clamping the focus ring. Applying such a clamp to a focus ring is not suggested by Shahvandi et al. Further, a focus ring clamp is a type which is not frequently exchanged so applying the clamp of Shahvandi et al. would be not economical. The clamp of clais 9 and 19 is thus not obvious nor would be suggested to one skilled in the art by the clamp of Shahvandi et al. Claims 9 and 19 are clearly patentably distinguishable over a combination of Nozawa and Shahvandi et al.

The present amendment is submitted under the provisions of 37 CFR §1.116 governing entry of amendments after final rejection. As stated in section (b) amendments canceling claims of complying with matter of form may be entered. Also, an amendment that places an application in condition for allowance may be entered, as stated in MPEP §714.12. The amendments made in this paper are those contemplated to be entered under these sections. Entry of the present amendment is in order, and is respectfully requested.

It is respectfully submitted that the present application is in condition for allowance and a favorable decision to that effect is respectfully requested.

Respectfully submitted,
OBLON, SPIVAK, McCLELLAND,
MAIER AND NEUSTADT, P.C.

Gregory J. Maier
Registration No. 25,599
Carl E. Schlier
Registration No. 34,426
Attorneys of Record

22850

Tel.: (703) 413-3000
Fax: (703) 413-2220
GJM/CES/maj
I:\ATTY\CES\206342US.AM_121702.DOC

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IN THE CLAIMS

Please amend the claims as follows:

1. (Twice Amended) A worktable device for a semiconductor process, comprising:

a worktable having a main surface for supporting a target substrate and a sub-surface disposed around said main surface;

a cooling mechanism disposed in said worktable and configured to supply cold to the main surface and the sub-surface;

a focus ring placed on the sub-surface and configured to surround the target substrate on the main surface, said focus ring consisting essentially of a conductive material;

a heat transfer medium interposed between the sub-surface and said focus ring, said heat transfer medium being so disposed as to improve thermal conductivity between the sub-surface and said focus ring to be higher than in a case with no thermal transfer medium, said heat transfer medium consisting essentially of a conductive material; and

a clamp configured to press said focus ring against the sub-surface,

wherein said cooling mechanism maintains said target substrate and the focus ring at substantially the same temperature.

3. (Amended) The device according to claim [2] 1, wherein said heat transfer medium consists essentially of [the] a heat-resistant elastic member selected from the group consisting of conductive silicone rubber and conductive fluororubber.

4. (Amended) The device according to claim [2] 1, wherein said heat transfer medium is adhered to the sub-surface with a heat transfer adhesive.

5. (Amended) The device according to claim [1] 21, wherein said heat transfer medium consists essentially of a heat transfer medium gas, and said apparatus further comprises a gas passage, formed in said worktable, in order to supply the heat transfer medium gas between the sub-surface and said focus ring.

6. (Twice Amended) The device according to claim [22] 5, wherein said heat transfer medium consists essentially of an inert gas or a gas containing part of a composition of a process gas to be supplied around said worktable.

12. (Amended) [The device according to claim 9, further comprising] A worktable device for a semiconductor process, comprising:

a worktable having a main surface for supporting a target substrate and a sub-surface disposed around said main surface;

a cooling mechanism disposed in said worktable and configured to supply cold to the main surface and the sub-surface;

a focus ring placed on the sub-surface and configured to surround the target substrate on the main surface;

a heat transfer medium interposed between the sub-surface and said focus ring, said heat transfer medium being so disposed as to improve thermal conductivity between the sub-surface and said focus ring to be higher than in a case with no thermal transfer medium;

a clamp configured to press said focus ring against the sub-surface;

a clamp frame having a contact portion which comes into contact with said focus ring from above, and an extending portion extending downward from the contact portion along a side portion of said worktable; and

an outer cover substantially made of heat-resistant synthetic resin and configured to cover said clamp frame,

wherein said cooling mechanism maintains said target substrate and the focus ring at substantially the same temperature.

14. (Twice Amended) A plasma processing apparatus for a semiconductor process, comprising:

a hermetic process chamber;

a supply system configured to supply a process gas into said process chamber;

an exhaust system configured to vacuum-evacuate an interior of said process chamber;

an excitation mechanism configured to excite and plasmatize the process gas;

a worktable disposed in said process chamber and having a main surface for supporting a target substrate and a sub-surface disposed around the main surface;

a cooling mechanism disposed in said worktable and configured to supply cold to the main surface and the sub-surface;

a focus ring placed on the sub-surface and configured to surround the target substrate on the main surface, said focus ring consisting essentially of a conductive material;

a heat transfer medium interposed between the sub-surface and said focus ring, said heat transfer medium being disposed so as to improve thermal conductivity between the sub-surface and said focus ring to be higher than in a case with no thermal transfer medium, said heat transfer medium consisting essentially of a conductive material; and

a clamp configured to press said focus ring against the sub-surface,

wherein said cooling mechanism maintains said target substrate and the focus ring at substantially the same temperature.

17. (Amended) The apparatus according to claim [14] 12, wherein said heat transfer

medium consists essentially of a heat transfer medium gas, and said apparatus further comprises a gas passage, formed in said worktable, in order to supply the heat transfer medium gas between the sub-surface and the focus ring.

21. (Amended) [The device according to claim 1,] A worktable device for a semiconductor process, comprising:

a worktable having a main surface for supporting a target substrate and a sub-surface disposed around said main surface;

a cooling mechanism disposed in said worktable and configured to supply cold to the main surface and the sub-surface;

a focus ring placed on the sub-surface and configured to surround the target substrate on the main surface;

a heat transfer medium interposed between the sub-surface and said focus ring, said heat transfer medium being so disposed as to improve thermal conductivity between the sub-surface and said focus ring to be higher than in a case with no thermal transfer medium; and

a clamp configured to press said focus ring against the sub-surface,

wherein said cooling mechanism maintains said target substrate and the focus ring at substantially the same temperature; and

wherein said clamp comprises an outer cover consisting essentially of a heat-resistant synthetic resin.